Automating the Solar Resource and Production Assessment
Intro

- Automating solar production analyses
  - What are we doing: cutting out some busy work
  - Why are we doing it: to get more information, earlier in the process
  - How are we doing it: python and python accessible software packages
  - Other applications: pipeline assessments, research & methodology updates, and more!
Background

Key definitions

- API (Application Programming Interface)
- SDK (Software Development Kit)
  - ways to interact with a tool through a programming language (python!)

Why do I care?

- Button pushing is a waste of everyone’s time
  - Meteorologist
  - Developer
  - Engineering
  - Capitol Estimating
  - Investment Office

Open Program or web browser

Navigate to project area or website

Fill out project specific information

Hit submit ....wait

Download data ....wait

Format and Analyze

Hit Run
Use Cases

[word in image]

Automated solar resource and energy assessment

- Get more information, earlier in the design process, to make more informed decisions
  - Site selection
  - Financing approval to continue project development
  - Design optimization, sensitivity, and risk
Use Cases

How we currently make these decisions:

Resource comparison
- Fast
- No technology assumptions required
- Available open-source options
- Tools exist (e.g. Solar Resource Compass)
- It’s a proxy for production. A good proxy, but still a proxy

Production comparison
- Higher fidelity
- Must make technology assumptions
- It’s more time intensive, so you are limited in the number of options you can explore
The Process

❖ That's a big project
  ❖ Deep breath
  ❖ Start small
  ❖ Get help
    - Another team member
    - Make friends in IT
    - A family member

❖ I'm not a computer programmer

❖ Start Smaller
  ❖ Take a class to learn the basics
    - Take the full class, don't cherry pick sections
    - I highly recommend Codecademy
      - Learn Python 2 class: free
      - Learn Python 3 class: $20 – 40 / month

❖ Figure out how to load your company's chosen data sources
  ❖ Use pandas
  ❖ Use functions (always recycle code)

❖ Create a (simple) resource comparison tool
  ❖ Use pandas + matplotlib
  ❖ Mimic the process you currently use
  ❖ Use functions (always recycle code)
  ❖ Test

❖ Create a (simple) loss calculation tool
  ❖ Calculate site soiling losses
  ❖ Calculate string sizing
  ❖ Calculate effective degradation
  ❖ Use functions (always recycle code)
  ❖ Test
The Process

Create a (simple) resource comparison tool
- Use pandas + matplotlib
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Connect the tools
- Your production is an input to your string sizing
- Your resource is an input to your production

Improve the tool
- Add in optionality
- Make it non-simple

Pull the inputs automatically
- Solar production modeling is complicated
- Pull the inputs automatically

Where we need APIs

Complex, time consuming, proprietary
The Process

Data source 1 → Resource comparison tool → Chosen data source and corrections → Resource formatting tool

Data source 2

Data source n

Precip. data → Soiling loss tool → Production Modeling → String sizing tool

Solar Production Assessment Summary

Production formatting tool → Post processing tool → Production Modeling

Optimization tool

**Automation is great. It is not a replacement for eyes on the data.**
Time Saving

- Automated solar resource and energy assessment
  - Get more information, earlier in the design process, to make more informed decisions

- Manual Assessments
  - Solar Resource Assessment (3 hrs)
  - Loss calculations (2 hrs)
  - Optimization (1-2 hrs)
  - Final modeling and processing (1 hr)

- Automated assessments
  - (minutes)
  - (seconds)

- Resource comparison
- Detailed production comparison
Conclusions and continuances

Solar developers:
- You do not need a computer science degree to automate your processes
- Automation → more information earlier in the process → more informed decision making
- Blind automation → bad data
- There are other useful applications for automated solar assessments
  - Pipeline analysis
  - Combination with financial modeling
  - Methodology studies and modeling research

Software, data, and tool providers:
- Most of you already provide programmatic access to the products you sell, and I really appreciate that
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Questions?
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